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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,834	06/27/2003	Kouji Nakahara	NIT-379	4822

7590 11/03/2004  
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EXAMINER

DICKEY, THOMAS L

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/606,834

Applicant(s)

NAKAHARA ET AL.

Examiner

Thomas L Dickey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 12-20 is/are rejected.
- 7) ☒ Claim(s) 3-11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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## DETAILED ACTION

1. The amendment filed 8/19/04 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2, and 12-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over SALVATORE et al. (2002/0131466) in view of MURAI et al. ("Lasing characteristics under high temperature operation of 1.55  $\mu\text{m}$  strained InGaAsP/InGaAlAs MQW laser with InAlAs electron stopper layer", Electronics Letters, Volume 31, Issue 24).

With regard to claims 1,12,14,16,18, and 19, Salvatore et al. discloses an optical semiconductor device, being an integrated light source in which a buried ridge type laser structure and an electro-absorption modulator are integrated, comprising an InP substrate 16; a plurality of layers 28-30-32-34-18, stacked on the InP substrate 16, including a multi-quantum well active layer 18 made of GaInAlAs; an GaInAlAs electron-stopping layer 36 (Salvatore et al. calls this layer a "upper carrier confinement layer," note paragraph 0026. Note further that Salvatore et al. explicitly states, in said

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paragraph, that the “upper carrier confinement layer” 36 confines electrons but not light) stacked on the plurality of layers 28-30-32-34-18; an InGaAsP layer 20 including a grating stacked on the GaInAlAs electron-stopping layer 36; wherein a concave depth of the grating included in the InGaAsP layer 20 is smaller than a thickness of the InGaAsP layer 20, an InP cladding layer 38, having the shape of a ridge mesa stripe (InP cladding layer 38 has the same ridge mesa stripe structure as waveguide 22, note figures 1 and 15b), stacked on the InGaAsP layer 20.

With regard to claims 2,13,15,17, and 20, Salvatore et al. discloses an optical semiconductor device, being an integrated light source in which a buried ridge type laser structure and an electro-absorption modulator are integrated, comprising an InP substrate 16; a plurality of layers 28-30-32-34-18, stacked on the InP substrate 16, including a multi-quantum well active layer 18 made of GaInAlAs; an GaInAlAs electron-stopping layer 36 (Salvatore et al. calls this layer a “upper carrier confinement layer,” note paragraph 0026. Note further that Salvatore et al. explicitly states, in said paragraph, that the “upper carrier confinement layer” 36 confines electrons but not light. Applicant has made it clear that the electron stopping layer must allow light to reach the grating from the active layer) stacked on the plurality of layers 28-30-32-34-18; an InGaAsP layer 20 including a grating stacked on the GaInAlAs electron-stopping layer 36; wherein a concave depth of the grating included in the InGaAsP layer 20 is smaller than a thickness of the InGaAsP layer 20, an InP spacer layer (no part #, described at paragraph 0027 as the upper of the InP layers in an InP/InGaAsP/InP structure) stacked

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on the InGaAsP layer 20; an InGaAsP etch stopping layer 44 stacked on the InP spacer layer; and an InP cladding layer 46, having the shape of a ridge mesa stripe (InP cladding layer 46 has the same ridge mesa stripe structure as waveguide 22, note figures 1 and 15b), stacked on the InGaAsP etch stopping layer 44.

Note figures 1,2, 15b, and paragraphs 0004-0010 and 0025-0029 of Salvatore et al. Although Salvatore et al. discloses a GaAlInAs electron-stopping layer, Salvatore et al. does not disclose an InAlAs electron-stopping layer. However, Murai et al. discloses an InAlAs electron-stopping layer, note figure 1 of Murai et al. Note also that Murai et al. teaches that because InAlAs has a significant band offset relative to both GaInAlAs and InGaAsP, the result is both an increase in quantum efficiency and a consequent decrease in laser operating temperature. Therefore, it would have been obvious to a person having skill in the art to replace the GaInAsP active layer of Salvatore et al.'s optical semiconductor device with the InAlAs electron-stopping layer such as taught by Murai et al. in order to raise the band offset between the electron-stopping layer and the active region and better confine electrons to the active region to thus increase quantum efficiency and decrease laser operating temperature.

***Allowable Subject Matter***

3. Claims 3-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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***Response to Arguments***

4. Applicant's arguments with respect to claims 1,2,4,5, and 10-18 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**TLD**  
**10/2004**

  
**Minhloan Tran**  
**Primary Examiner**  
**Art Unit 2826**